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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/502,104

09/19/2005

Dror Shemesh

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10/21/2008

APPLIED MATERIALS, INC.

C/O SONNENSCHN NATH & ROSENTHAL LLP

P.O. BOX 061080

WACKER DRIVE STATION, SEARS TOWER

CHICAGO, IL 60606-1080

EXAMINER

JOHNSTON, PHILLIP A

ART UNIT

PAPER NUMBER

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10/21/2008

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/502,104	<b>Applicant(s)</b> SHEMESH ET AL.	
	<b>Examiner</b> PHILLIP A. JOHNSTON	<b>Art Unit</b> 2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 August 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5,9-15,17 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5,9-15,17 and 19-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8-8-2008</u>  | 6) <input type="checkbox"/> Other: _____                          |

***Detailed Action***

1. This Office Action is submitted in response to the RCE/Amendment filed 9-19-2008, wherein claims 1-5, 9-15, 17, and 19-21 are pending.

***Claims Rejection – 35 U.S.C. 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

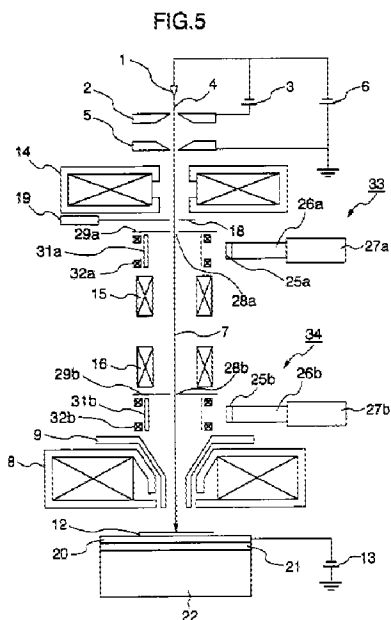
4. Claims 1-3, 5, 9-11, 13-15, 17, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6,084,238 to Todokoro, in view of Adamec USPN 7,045,781, and in further view of Ose, USPN 6,787,772.

5. Regarding claim 13, Todokoro discloses a scanning electron microscope shown in Figure 5 below having;

(a) Primary electron beam 7 and a column through which the beam propagates along an axis to sample 12. See Col. 5, line 15-26,

(b) upper deflector 15 located downstream of interior (inner-lens) detector 33, and lower deflector 16 located upstream of detector (inner-lens) 34. Col. 8, line 22-34. Deflectors 15 and 16 are scanning deflectors, which deflect the primary beam across the sample 12. See Col. 5, line 45-53.

(c) sample 12 is located in the gap of the objective lens 8, where a high (substantial) electric field is introduced. Col. 8, line 15-21,



(d) impinging the primary beam on sample 12 to generate secondary electrons, that include reflected and scattered which are extracted into an aperture of the objective lens by the electric field applied across the objective lens and the sample where they are directed up through acceleration tube 9 towards one of the interior detectors. Col. 2, line 20-25; and Col. 5, line 15-26.

Todokoro fails to disclose deflecting the primary beam away from the first optical axis to propagate along a second optical axis substantially parallel to and spaced-apart from the first optical axis.

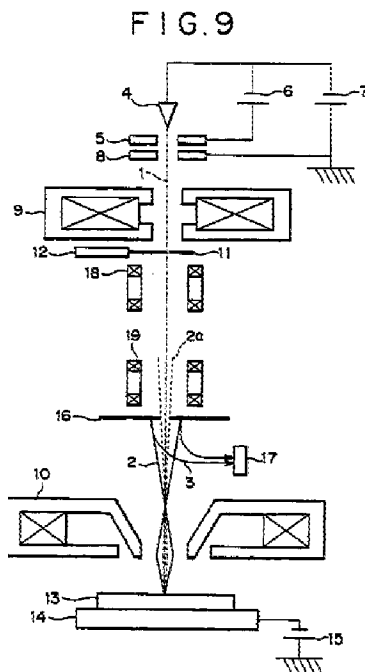
Adamec discloses the use of deflecting units which deflect the beam away from the first optical axis to propagate along a second optical axis parallel to the first axis. See Col. 8, line 1-29; Col. 10, line 27-33; and note Figure's 3 and 5.

Adamec modifies Todokoro to provide a deflector to redirect the primary beam so that it propagates parallel to the principle axis and irradiates the sample with a parallel beam.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made that Todokoro would deflect the primary beam in accordance with Adamec to provide a primary beam for parallel imaging in order to obtain higher throughput.

The combination of Todokoro and Adamec fails to teach the trajectory of at least some of the electrons is substantially coincident with one of the first and second optical axes.

Ose discloses irradiating a sample with a primary electron beam 1 in Figure 9 below where some of the generated secondary electrons 2a leave the surface of the sample near the primary beams optical axis. Col. 4, line 31-53



Ose modifies the combination of Todokoro and Adamec to provide means for detecting secondary electrons propagating near the optical axis of the primary electron beam

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made that the combination of Todokoro and Adamec would use the detection means of Ose to detect secondary electrons that travel along a path slightly deviating from the optical axis thereby obtaining a high resolution two-dimensional electron image representing the shape of the surface of the specimen.

6. Regarding claim 1, the combination of Todokoro, Adamec and Ose discloses the apparatus used in this method claim, as pointed out above regarding claim 13.

7. Regarding claims 2 and 14, Todokoro discloses at Col. 4, line 64-67; and Col. 5, line 1-13, applying a negative superimposed voltage 13 to the sample 18 (a first voltage potential difference between the inspected object and a first portion of the column) and applying a post acceleration voltage 10 to acceleration tube 9 (a second voltage potential difference between a second portion of the column and the inspected object).

8. Regarding claims 3 and 15, Todokoro discloses at Col. 6, line 13-29, that voltage 13 is 500V and voltage 10 is 1000V. Also as shown in Figure 1, the first portion of the column is positioned below the second portion.

9. Regarding claims 5 and 17, Todokoro teaches the use of different detector collection zones. See Col. 9, line 36-43.

10. Regarding claims 9 and 19, Todokoro teaches an area of the inspected object is positioned within the substantial electrostatic lens (note Figure 4); and Col. 8, line 16-21.

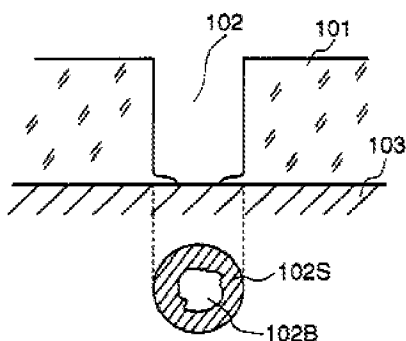
11. Regarding claims 10, 11, and 20, Todokoro teaches tilting the sample and measuring the inclination. Col. 14, line 5-15.

12. Claims 4, 12, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6,084,238 to Todokoro, in view of Adamec USPN 7,045,781, in further view of Ose, USPN 6,787,772, and in still further view of Todokoro, U.S. Patent No. 6,635,873.

13. Regarding claims 4, 12, and 21 the combination of Todokoro (238), Adamec and Ose discloses nearly all the limitations of claims 4, 12, and 21 as described above regarding claim 13, but fails to disclose processing the received detection signals to provide an indication about a defect or a process variation; and wherein detected electrons include electrons from a lower portion of a high aspect ratio hole.

14. Todokoro (873) teaches observing residue at the bottom of a high aspect ratio contact hole. See Figure 14b below; Col. 2, line 8-18; and Col. 5, line 39-49.

**FIG. 14B**



15. Todokoro (873) modifies the combination of Todokoro (238), Adamec and Ose to provide a technique for displaying the condition of a contact hole formed in an insulator on the display screen of a scanning electron microscope.

16. Therefore it would have been obvious to one of ordinary skill in the art that the combination of Todokoro (238), Adamec and Ose would use the contact hole imaging technique of Todokoro (873) to provide a scanning electron microscope for observing the bottom of a contact hole formed on an observation sample such as an IC.

### ***Conclusion***

17. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (571) 272-2475. The examiner can normally be reached on Monday-Friday from 7:00 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiners supervisor Robert Kim can be reached at (571)272-2293. The fax phone number for the organization where the application or proceeding is assigned is 571 273 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should



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you have questions on access to the Private PAIR system, contact the Electronic  
Business Center (EBC) at 866-217-9197 (toll-free).

PJ

October 16, 2008

/Phillip A Johnston/

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